



State of Illinois

ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director

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DECLARATION OF THE RECORD OF DECISION

EPA Region 5 Records Ctr.



206945

GROUNDWATER RESPONSE ACTION SOUTHEAST ROCKFORD GROUNDWATER CONTAMINATION SITE ROCKFORD, ILLINOIS

SEPTEMBER 1995

Site Name and Location

The Southeast Rockford Groundwater Contamination Site is the subject of this Record of Decision. It is located in Rockford, Illinois in Winnebago County.

Statement of Basis and Purpose

This decision document presents the selected groundwater remedial action for the Southeast Rockford Groundwater Contamination Site in Rockford, Illinois, which was chosen in accordance with the Illinois Environmental Protection Act, 415 Ill. Comp. Stat. 5/1 (1994) et. seq., the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site. The United States Environmental Protection Agency (USEPA) Region V concurs with the selected remedy.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the groundwater response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare or the environment.

Description of the Remedy

The selected remedial action addresses groundwater contamination as defined in the Remedial Investigation. The function of this action will be to rapidly eliminate current and potential human exposures to groundwater contaminants originating mainly from four identified source areas of groundwater contamination. As further control of the four identified major source areas is assumed in this groundwater remedy, the degree and time to which groundwater in this aquifer is restored will be dependant on the extent to which source areas are remediated in the future.

The major components of the selected groundwater response remedy are as follows:

- City water main extensions;
- Water service connections to selected homes and businesses;
- Groundwater monitoring;
- Future water service connections to selected homes and businesses (if necessary);
- Future source control measures (to be determined);
- Continued use of granular activated carbon treatment at Rockford Municipal Well UW-35;
- Institutional controls.

Declaration

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the groundwater remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principle element.

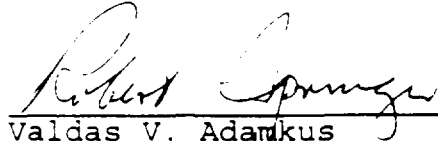
Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted within five years after commencement of groundwater remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.


Mary A. Gade
Mary A. Gade, Director
Illinois Environmental Protection Agency

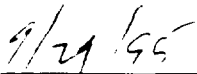
9/29/95
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1.

The United States Environmental Protection Agency (U.S. EPA) concurs with the State of Illinois in the selected ground water response action for the Southeast Rockford Ground Water Contamination Site in Rockford, Illinois.



 Valdas V. Adamkus
Regional Administrator


Date

RECORD OF DECISION SUMMARY
GROUNDWATER RESPONSE ACTION
SOUTHEAST ROCKFORD GROUNDWATER CONTAMINATION SITE
ROCKFORD, ILLINOIS

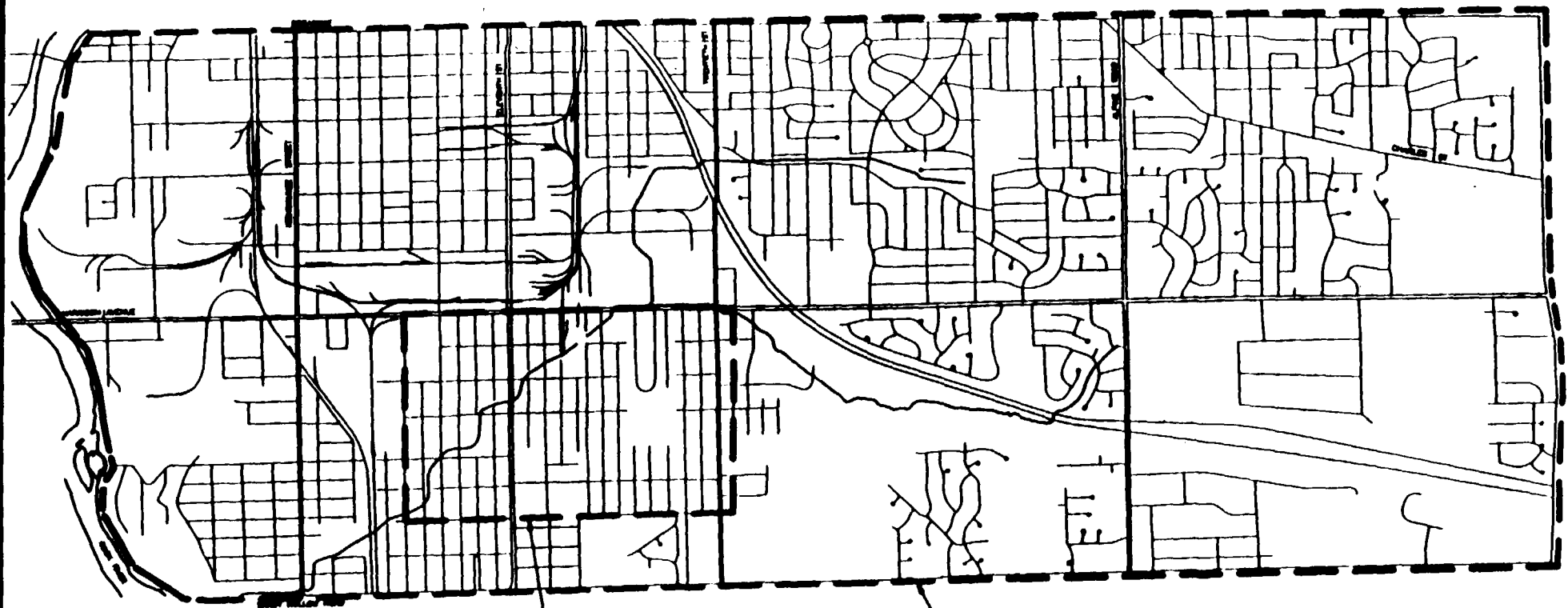
I. Site Location and Description

The Southeast Rockford Groundwater Contamination Site is located in a residential and commercially zoned area in the southeast portion of Rockford, Illinois. When the site was originally listed on the National Priorities List (NPL), the nature and extent of groundwater contamination was largely unknown. As groundwater data from residential and monitoring wells has been collected, the project "study area" was initially expanded from the original NPL description to include an area of about five square miles. The study area was later expanded to an area of ten square miles with boundaries that now include Broadway to the north, Sandy Hollow Road to the south, Mulford Road to the east and the Rock River to the west. The original site boundaries and current study area are noted on page 2. The Illinois Environmental Protection Agency (IEPA) and the United States Environmental Protection Agency (USEPA) understand the current site boundaries to be the groundwater contaminant plume of chlorinated volatile organic compounds (VOCs) that was defined in the Remedial Investigation (RI). This groundwater plume is noted on page 3.

The study area is a predominantly suburban residential area with scattered industrial, retail and commercial operations throughout. Most of the building structures at this site are one or two story residential dwellings, but several industrial areas also exist next to residential areas along Harrison Avenue. There is a substantial number of commercial and retail operations along Alpine Road, Eleventh Street and Kishwaukee Street. The topography of the site is essentially flat-lying, with gradual sloping towards the Rock River. The four major identified source areas of groundwater contamination at the site are noted on page 3. Other groundwater plumes in the study area were investigated, but were not determined to be sources of chlorinated VOCs found in residential wells.

Because of a relative abundance of groundwater resources, the City of Rockford's primary source of potable water is groundwater. The Rock River to the west of the site is not used as a source of drinking water. IEPA estimates that there are currently fewer than 600 residential wells within and adjacent to the site boundaries. A smaller number of businesses with potable use wells are present at the central portion of the site along Eleventh Street north of Sandy Hollow Road.

The site was proposed for inclusion to the NPL on June 24, 1988 and was formally added to the NPL on March 31, 1989 as a State-lead, federally funded Superfund site. The USEPA identification number for this site is ILD981000417.



USEPA - NATIONAL PRIORITIES LIST (NPL)
SITE BOUNDARY

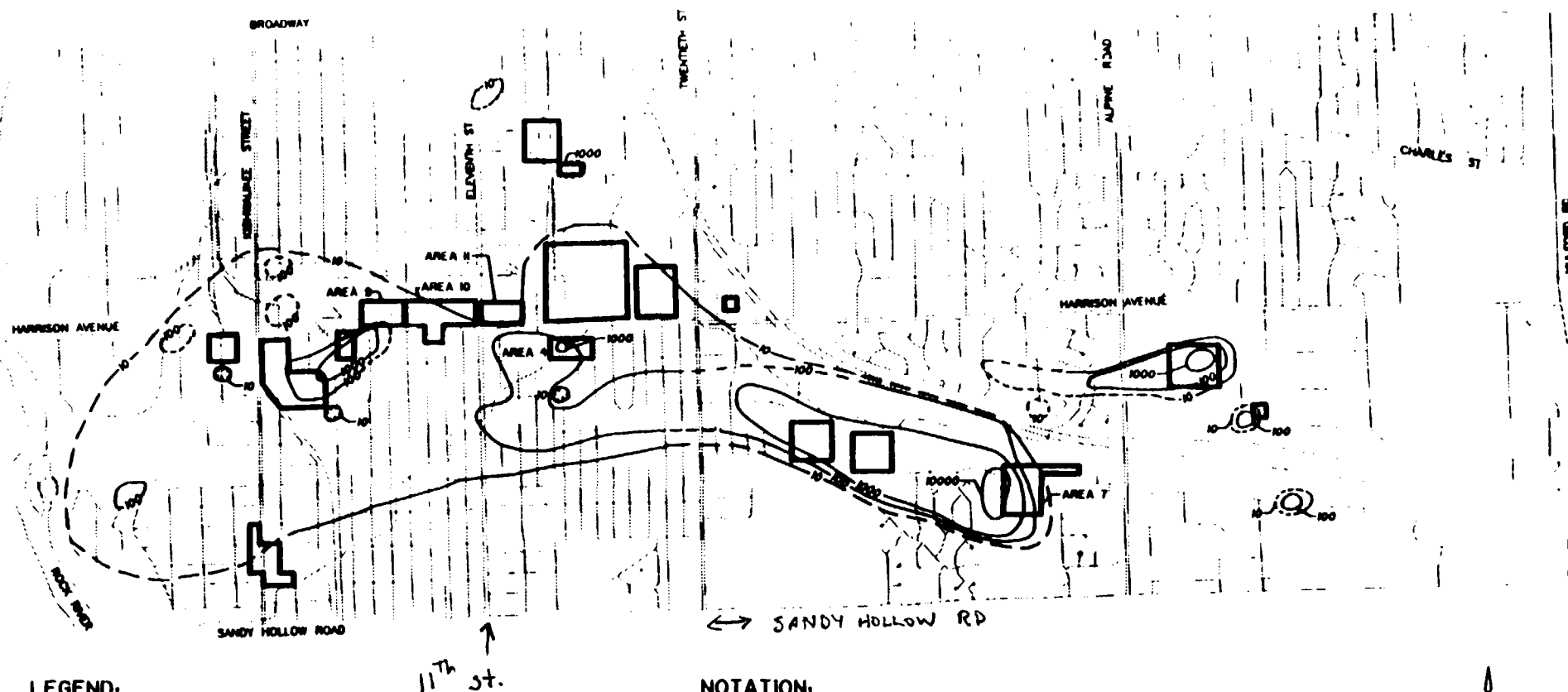
SOUTHEAST ROCKFORD
GROUNDWATER CONTAMINATION
IN STUDY AREA



SCALE
0 500 1000 Feet

SOUTHEAST ROCKFORD
GROUNDWATER CONTAMINATION STUDY

NPL SITE BOUNDARY



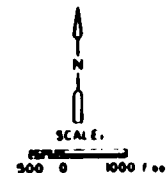
LEGEND:

~100~ TOTAL CHLORINATED VOC CONTOUR (ug/l)
DASHED WHERE INFERRED.

□ POTENTIAL SOURCE INVESTIGATION AREA.
UNNUMBERED AREAS WILL NOT BE SUBJECT TO
FURTHER STUDY UNDER THIS PROJECT.

NOTATION:

THIS MAP SHOWS THE EXTENT OF CHLORINATED VOCs
IN GROUNDWATER. NON-CHLORINATED VOCs (SUCH AS
THOSE FOUND AT AREA III) WERE FOUND LESS FREQUENTLY
IN PHASE II AND DO NOT APPEAR ON THIS MAP.



SOUTHEAST ROCKFORD
GROUNDWATER CONTAMINATION STUDY
TOTAL CHLORINATED VOCs IN

II. Site History and Enforcement Activities

To date, the actual site activities that led to groundwater contamination problems at this site are largely unknown. Site investigation work performed during the RI noted four primary source areas of groundwater contamination. Of these four source areas, aerial photographs have been useful in identifying the periods during which one former disposal area was operated. The figure on page 3 notes the location of the four source areas.

The disposal area (noted as "Area 7" throughout this document) apparently began operating in the early to mid-1950s and continued through 1970. Although it is not precisely known what volume and time period hazardous wastes were disposed of in Area 7, limited investigations have revealed that most hazardous waste disposal activities occurred in the late 1950s to early 1960s during the property ownership of George Johnson. Site investigations at Area 7 have revealed that chlorinated solvents, waste oils and fuels, paint sludges, tank bottoms, hospital wastes and general refuse were disposed of in this landfill. The primary method of disposal appears to have been direct discharge of liquids or sludges into an old creek ravine which has since been covered. Since the site was operated before the effective date of the Resource Conservation and Recovery Act (November 19, 1980), actual types of disposal methods were determined by witness information.

Another source area of contamination identified in the RI report was at the Swabco Manufacturing facility designated as "Area 4". This area appears to be a location where spills and discharges of waste solvents and oils occurred over recent years.

The former Rockford Varnish facility comprises "Area 11". Like Area 4, this area appears to have been the location of several spills and discharges. The facility has been abandoned for years and the time period of any spills and discharges is not known.

"Area 9/10" is located north of the Ninth Street-Harrison Road intersection. Site investigations have indicated a large plume of groundwater contamination downgradient from an old industrial area. The smaller size of this plume indicates that groundwater contamination may be coming from a spill area or a location where chlorinated solvents were dumped on the ground surface. The precise location of the source area responsible for groundwater contamination here is unknown.

Although VOCs were initially detected in several City of Rockford municipal wells as early as 1981, IEPA became aware of a VOC problem in residential wells in 1984. Following an October, 1984 study by the Illinois Department of Public Health (IDPH), high levels of chlorinated solvents were found to be present in several residential wells. These solvents included 1,1,1-trichloroethane, trichloroethene and tetrachloroethene. IDPH took an additional 337 water samples from residential wells between 1985 and 1989 to better determine how many residents were affected. The Illinois State Water Survey (ISWS) also performed a regional groundwater

investigation. This investigation noted widespread residential and municipal well contamination. As a result of general groundwater contamination in Rockford, the City closed several municipal wells in southeast Rockford.

In August, 1989, the USEPA sampled 112 residential wells around the site to determine if immediate removal actions were warranted. Later that year, USEPA initiated a time critical removal action that included bottled water for residents whose wells showed VOC levels greater than or equal to 25% of the Removal Action Level (RAL). The same residents received point-of-use carbon filters in December 1989 as another interim measure. USEPA ultimately extended municipal water mains and provided service connections to city water for 283 residents as a time critical removal action. This action was completed in late 1991.

IEPA began an operable unit groundwater RI and Feasibility Study (FS) that included sampling of 117 residential, commercial and industrial wells. The objective of this sampling event was to determine how many homes had wells with VOC levels below RALs, but above Maximum Contaminant Levels (MCLs). A Proposed Plan, outlining 264 homes to be hooked up to municipal water and the installation of a temporary granulated activated carbon (GAC) unit at one municipal well that had been closed due to unsafe levels of VOCs, was made public in March 1991. This GAC unit was installed to ensure sufficient capacity for residents added to the city's water supply system. Between USEPA's time critical removal action and IEPA's Operable Unit RI/FS, a total of 547 homes were hooked up to municipal water. All residents who received connections were required to have their wells abandoned in accordance with State law. A Record of Decision (ROD) for this Operable Unit was signed on June 14, 1991. Construction of the service connections and GAC unit was initiated immediately and carried out under USEPA's removal program so that the project could be completed on a shorter timeframe. A Remedial Action Report certifying that the selected remedy for the Operable Unit RI/FS was operational and functional was signed on December 21, 1992.

After the threat of exposure to groundwater contaminants was greatly reduced by the above-mentioned actions, the next phase of the project involved an inclusive groundwater RI/FS. The objective of the groundwater RI was to characterize the nature and extent of groundwater contamination as well as to provide information on source areas that were responsible for contaminants in and around residential wells abandoned in previous IEPA/USEPA actions. It was decided to conduct the RI in phases since locations of the source areas were not known at that time.

It is likely that a great deal of the groundwater contamination at the Site results from historical waste disposal operations. As a result, information on potentially responsible parties (PRPs) associated with this site was difficult to obtain. Analytical data from initial residential well sampling and the first phase of the groundwater RI/FS gave a preliminary understanding of the nature and extent of groundwater contamination. These data were useful to

the USEPA in an ongoing enforcement information gathering process that began with CERCLA Section 104(e) Information Request Letters being sent to a number of companies within the study area. Several responses documented historical releases of chlorinated solvents similar to the contamination found in groundwater at the site. On the basis of this information, USEPA issued Special Notice of Liability Letters to a group of PRPs on January 31, 1992. This PRP group included the following companies:

Borg-Warner Corporation
Erhardt & Leimer, Inc.
Estwing Manufacturing Company
Gordon Bartels Company
Rockford Products Corporation
Sundstrand Corporation
Suntec Industries, Inc.

In addition to information obtained from the Section 104(e) process, eyewitness accounts of waste disposal at Area 7 have recently surfaced. USEPA and the United States Department of Justice (USDOJ) are currently evaluating this information. The enforcement information gathering process continues at the site.

III. Highlights of Community Participation

The RI report for the Southeast Rockford Groundwater Contamination site was released to the public in February 1995. The public comment FS and Proposed Plan were made public on July 10, 1995. These two documents are available for public review in both the administrative record and the information repositories maintained at the Rockford Public Library-Main Branch and the Ken-Rock Community Center and Rockford Public Library-Rock River Branch, respectively. The notice of availability for the FS and Proposed Plan was published in the Rockford Register Star on July 10, 1995. A public comment period was held from July 14, 1995 to August 16, 1995. In addition, two public meetings were held on August 1, 1995 and two public hearings were held on August 9, 1995. At these meetings, representatives from IEPA, USEPA and IDPH were available to answer questions about the problems at the site and the remedial alternatives under consideration. A response to the comments received during the public comment period is included in the Responsiveness Summary, which is part of this Record of Decision. This decision document presents the selected remedial action for groundwater portion of the Southeast Rockford Groundwater Contamination Site in Rockford, Illinois chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, the Illinois Environmental Protection Act and, to the extent practicable, the National Contingency Plan. The decision for this site is based on the administrative record.

IV. Scope and Role of Response Action within Site Strategy

As with many Superfund sites, the environmental problems at the Southeast Rockford site are complex. As a result, IEPA and USEPA organized the work into three operable units, as follows:

- Operable Unit One: Initial Contamination in Residential Wells
- Operable Unit Two: Present and Future Contamination in Potable Use Wells and Contamination of the Groundwater Aquifer
- Operable Unit Three: Contamination in Soils (Source Control)

As previously discussed, IEPA and USEPA implemented a remedy for Operable Unit 1 in a ROD dated June 14, 1991. Contaminated groundwater is the primary threat at this site because of the direct ingestion of drinking water from wells that contain contaminants above health-based levels.

The second operable unit, the subject of this ROD, primarily addresses future contamination in all drinking water wells within and adjacent to the site, as well as site-related chlorinated solvent contamination of the groundwater aquifer as a whole. In addition, it will finalize temporary measures (e.g. the GAC unit) as noted in operable unit 1. Although source control is a component of the selected remedy outlined in this ROD, the source control technology will be selected in operable unit 3. Source control implemented at the completion of operable unit 3 will finalize groundwater response actions taken in this ROD and will bring these actions into compliance with State groundwater protection laws.

Operable unit 3 will be the final response action for this site.

V. Summary of Site Characteristics

Field activities for the RI were conducted from January 1993 to January 1994. These activities included the performance of soil borings and test pits, installation and sampling of new monitoring wells, sampling of existing private and ISWS monitoring wells, collection of surface soil samples, a geophysical survey, sampling of residential wells and indoor air, and soil gas surveys at 14 suspected source areas. These activities and their corresponding number of sampling points (where applicable) are noted below:

Soil borings (55)	Geophysical Survey
Subsurface Soil Samples (116)	Residential Wells Sampled (24)
Test Pits (2)	Residential Indoor Air Samples (20)
Monitor Well Installations (77)	Soil Gas Points (515)
Monitor Well Samples (233)	
Surface Soil Samples (10)	

The RI concluded that there are four source areas that impact the major plume which constitutes the site (see page 2). Although several other plumes of contamination were identified, source areas that were found to have the greatest impact on groundwater quality include; Area 4, Area 7, Area 9/10 and Area 11. A brief description of each source area and the degree to which it impacts the major plume of contamination is noted as follows:

Area 4: Located at Marshall Street and Alton Avenue, high concentrations of 1,1,1-trichloroethane (TCA) were found in soils beneath a parking lot at the Swabco facility. Significant groundwater contamination downgradient from this facility as well as high levels of TCA, a noncarcinogen, in soil gas were noted in the RI report. Soil contamination at up to 360 parts per million (ppm) covers approximately 3,750 ft² and appears to extend to a depth of 32 feet. Assuming a thickness of 8 feet, the volume of highly contaminated soil was estimated at 1,100 yd³ with a weight of TCA at 977 pounds. As TCA from the contaminated soils are water soluble, contaminants from Area 4 are highly mobile in groundwater as evidenced by high levels of TCA in downgradient wells (1ppm). Residential air sampling has shown migration of TCA vapors from Area 4 into nearby basements, but at levels which are more of a long-term health concern.

The potential pathways of contaminant migration include groundwater and void spaces in soils (e.g. soil gas). Surface migration of contaminants is not likely given that most of Area 4 is paved. A table noting Area 4 contaminants and maximum concentrations in both subsurface soils and groundwater is presented on page 9.

Area 7: The most significant source of groundwater contamination in Southeast Rockford. Area 7 was found to contain extremely high levels of chlorinated and non-chlorinated solvents including TCA (380ppm), tetrachloroethene (PCE) at 260ppm, trichloroethene (TCE) at 130ppm and xylene (210ppm). Toluene, ethylbenzene and various degradation products of chlorinated solvents were also found. PCE and TCE are classified as probable carcinogens. Downgradient monitoring wells have shown significant groundwater contamination from Area 7 migrating far beyond Eleventh Street. Primary groundwater contaminants associated with this area include TCA (8ppm), cis-1,2-dichloroethene (5.9ppm), PCE (1.2ppm) and TCE (0.65ppm) in nearby downgradient monitoring wells. TCA, PCE and TCE were also found in soil gas at combined levels of up to 5.59 parts per billion (ppb). Based on field screening methods, soil contamination exists to depths of over 47 feet below ground. The volume of soils contaminated with TCA over (0.1ppm) was estimated at 260,000yd³ (13,500 pounds of TCA) in the portions of Area 7 that were sampled. Final waste volume estimates in Area 7 will be higher considering that the disposal area extends much farther to the north. Contaminants found in this area are water soluble and highly mobile in groundwater as evidenced by analyses of groundwater in downgradient wells. A table noting Area 7 contaminants and maximum concentrations in both subsurface soil and groundwater is noted on page 9.

VOC Contaminant Concentration Ranges - Area 4		
Contaminant	Concentration Range in Soils (ppb)	Concentration in Groundwater (ppb)
Benzene	BDL-2J	BDL
1,1-Dichloroethane	BDL	26J
1,1-Dichloroethene	BDL	10J
1,2-Dichloroethene (total)	BDL	25J
Chlorobenzene	BDL-2J	BDL
Tetrachloroethene	BDL-1J	BDL
Toluene	BDL-41	43J
1,1,1-Trichloroethane	BDL-360,000	1,000
Trichloroethene	BDL	28J
Xylene	BDL	28J

VOC Contaminant Concentration Ranges - Area 7		
Contaminant	Concentration Range in Soils (ppb)	Concentration Ranges in Groundwater (ppb)
1,1-Dichloroethane	BDL-240J	BDL-220J
1,1-Dichloroethene	BDL-11J	BDL-180J
Chloroform	BDL-2J	BDL-23
1,2-Dichloroethane	BDL-180	BDL-13
1,2-Dichloroethene (total)	BDL-49,000	BDL-5,900
Ethylbenzene	BDL-31,000	BDL-210
Tetrachloroethene	BDL-260,000	BDL-1,200
Toluene	BDL-23,000J	BDL-170
1,1,1-Trichloroethane	BDL-380,000	BDL-8,000
1,1,2-Trichloroethane	BDL-7J	BDL
Trichloroethene	BDL-130,000	BDL-650
Vinyl Chloride	BDL	BDL-75
Xylene	BDL-210,000	BDL-1,100

Contaminants included in these tables include chlorinated VOCs and the more common non-chlorinated VOCs. Semivolatiles have been found at both source areas, but were not found to have a significant impact on groundwater quality. These contaminants include low concentrations of naphthalene, methylnaphthalene, phthalates, polyaromatic hydrocarbons, PCBs and pesticides. Areas 4 and 7 were not completely sampled. These source areas will be further characterized in operable unit 3 (source control).

Notes: BDL - Below Detection Limits
J - Estimated Values

Surface soil samples at Area 7 (inclusive of Ekberg Park) have shown only trace levels of contaminants. Residential air sampling around Area 7 found only trace levels of contaminants in basements and no correlation between Area 7 site contaminants and low levels of basement air contaminants was drawn.

The potential pathways of contaminant migration from Area 7 are through groundwater and void spaces in soils.

Area 9/10: An unknown source of groundwater contamination is present in the vicinity north of the Harrison Avenue/Ninth Street intersection. Downgradient monitoring wells have shown elevated levels of 1,1-dichloroethane (2.1ppm), TCA (0.61ppm) and chloroethane (0.5ppm). 1,1-dichloroethane is a possible human carcinogen. As is the case in other source areas, these contaminants are highly mobile in groundwater. Since the location of this source has not yet been identified, potential migration pathways cannot be determined, although high soil gas readings on an adjacent property might indicate a vapor migration pathway through soils. The table on page 11 presents a summary of Area 9/10 groundwater contaminants and respective maximum concentrations.

Area 11: Located east of Eleventh Street and Harrison Avenue, Area 11 is the site of the former Rockford Varnish facility. Contaminants found in soils near Area 11 include xylene (2,300ppm), toluene (1,400ppm), ethylbenzene (590ppm) and benzene (1.5ppm) at depths of beyond 40 feet. Benzene is a known human carcinogen. Chlorinated solvents were not found at Area 11, however the high levels of the above compounds may have masked the presence of chlorinated solvents in the analyses (e.g. an undiluted concentration of 0.86ppm TCA from a nearby monitoring well). Area 11 does appear to be a significant source of non-chlorinated VOCs in groundwater as evidenced by analyses from monitoring wells close to the source area. Contaminants associated with Area 11 are highly mobile in groundwater. A vapor migration pathway through soils is likely, but has not been established. A table listing Area 11 contaminants and maximum concentrations in various media are noted on page 11.

Several other source areas were identified in the RI. These other source areas did not evidently contribute to the major plume of contamination noted on page 2. Non-contributing source areas found in the RI will be addressed by other State/Federal environmental programs. The primary constituents of major plume include TCA, TCE, and PCE plus the degradation products associated with these compounds. Xylene, toluene and ethylbenzene are also prevalent in portions of this plume and may have fostered accelerated anaerobic degradation of chlorinated solvents in localized portions of the plume. The RI found site-related groundwater contaminants present in the upper sand and gravel aquifer, permeating to depths of up to 220 feet below ground into bedrock. Limited investigations on bedrock characteristics have shown extensive fracturing. Using reasonable assumptions, groundwater modeling was used to predict future contaminant concentrations within the plume and to project general plume migration directions.

VOC Contaminant Concentrations - Area 9/10		
Contaminant	Concentration Range in Soils (ppb)	Concentration Ranges in Groundwater (ppb)
Chloroethane	N/A	BDL-500
1,1-Dichloroethane	N/A	BDL-2,100
1,1-Dichloroethene	N/A	BDL-410
1,2-Dichloroethane	N/A	BDL-6J
1,2-Dichloroethene (total)	N/A	BDL-210
Ethylbenzene	N/A	BDL-19
Tetrachloroethene	N/A	BDL-50J
Toluene	N/A	BDL-420
1,1,1-Trichloroethane	N/A	BDL-1,400
1,1,2-Trichloroethane	N/A	BDL-60J
Trichloroethene	N/A	BDL-140
Vinyl Chloride	N/A	BDL-14
Xylene	N/A	BDL-77

VOC Contaminant Concentrations - Near Area 11		
Contaminant	Concentration Range in Soils (ppb)	Concentration Ranges in Groundwater (ppb)
Benzene	BDL-1,500	BDL-23J
Ethylbenzene	BDL-590,000	BDL-2,000J
Tetrachloroethene	BDL-46	BDL
1,1,1-Trichloroethane	BDL-3J	BDL-860
Trichloroethene	BDL	BDL-170J
Toluene	BDL-1,400,000	BDL-310,000
Xylene	BDL-2,300,000	BDL- 9,500

Since the location of Area 9/10 is unknown, contaminant ranges in soils were not available. Source data for Area 11 is incomplete. Area 9/10 and Area 11 will be fully characterized in operable unit 3 (source control).

Notes: BDL - Below Detection Limits
J - Estimated Values
N/A - Not Available

All mass and volume figures noted in Section V are rough estimates and will be refined in the upcoming source area investigations to be taken in operable unit 3.

VI. Summary of Site Risks

A human health risk assessment was performed at selected residential wells at the site. The objective of this assessment was to evaluate current and future exposures associated with potable groundwater usage at the site in the absence of groundwater remediation. This risk assessment analyzed the toxicity and degree of hazard posed by site groundwater contaminants and described the probable routes by which they come into human contact. The complete risk assessment for the site may be found in Section 6 of the RI.

Separate risk estimations were made for site-related compounds that can cause cancer (carcinogens). Risk estimated for carcinogens was assessed as the additional possibility of developing cancer due to a thirty year exposure to these compounds in groundwater averaged over a lifetime of seventy years. The National Contingency Plan (NCP) establishes acceptable levels of risk for Superfund sites ranging from 1 in 10,000 (1×10^{-4}) to 1 in one million (1×10^{-6}) excess cancer cases. "Excess" means the number of cancer cases in addition to those that would ordinarily occur in a population of that size due to non site-related factors. For non-cancer causing compounds, a risk estimation known as the "hazard index" is used. Typically, hazard indices below 1 indicate that no adverse health effects are expected, while values greater than 1 are indicative of possible adverse health effects. The "Contaminants of Concern" evaluated in the risk assessment are noted below:

Methylene chloride	Chloroform
1,1-Dichloroethene	1,2-Dichloroethane
1,1-Dichloroethane	1,1,1-Trichloroethane
cis-1,2-Dichloroethene	Trichloroethene
trans-1,2-Dichloroethene	Tetrachloroethene

Twenty-four residential wells were sampled in the RI to determine if the contaminant plume had migrated into areas where residential wells still existed. The wells that were sampled were located at the margins of the plume and were expected to have the highest concentrations of site-related contaminants. Concentration ranges of these contaminants in residential wells are noted on page 13.

To evaluate potential current and future threats to human health, risk estimates were developed for domestic usage of groundwater downgradient from identified source areas. Exposure routes considered in this scenario include:

1. Ingestion of groundwater from residential wells.
2. Dermal contact with groundwater from residential wells through showering.
3. Inhalation of site-related contaminants which volatilized from residential wells during and immediately after showering.

CHEMICALS DETECTED IN RESIDENTIAL WELLS

Compound	Frequency of Detection (24 wells total)	Range of Detected Concentrations (µg/l)	Range of Detected Concentrations (mg/l)	Range of Detection Limits (µg/l)	MCL (mg/l)	Illinois Groundwater Quality Standards Class I (mg/l)
Methylene Chloride	2/24	0.2J - 0.4J	0.0002J - 0.0004J	2 - 10	-	-
1,1-Dichloroethene	5/24	0.3J - 5	0.0003J - 0.005	1 - 5	0.007	0.007
1,1-Dichloroethane	12/24	0.1J - 15	0.0001J - 0.015	1 - 5	-	-
C-1,2-Dichloroethene	5/24	1 - 10	0.001 - 0.010	1 - 5	0.07	0.07
Trans-1,2-Dichloroethene	1/24	0.2J	0.0002J	1 - 5	0.01	0.1
Chloroform	8/24	0.2J - 0.5J	0.0002J - 0.0005JD	1 - 5	0.10*	-
1,2-Dichloroethane	2/24	0.5J - 0.6J	0.0005J - 0.0006J	1 - 5	0.005	0.005
1,1,1-Trichloroethane	20/24	0.6J - 50D	0.0006J - 0.050D	1 - 5	0.2	0.2
Trichloroethene	20/24	0.2JB - 8	0.0002JB - 0.008	1 - 5	0.005	0.005
Tetrachloroethene	15/24	0.2J - 4	0.0002J - 0.004	1 - 5	0.005	0.005

Notes:

*: For trihalomethanes

Table does not include detections for field blanks, trip blanks, or duplicate samples.

J: Estimated Value

B: Blank Contamination

D: Dilution

Risks associated with inhalation of indoor air potentially impacted by vapor migration from groundwater and/or soils near identified source areas were qualitatively evaluated in this risk assessment. These risks will be evaluated in the upcoming source area RI.

The toxicity assessment involved an analysis of the toxicological properties of the Contaminants of Concern. Two types of toxicity values are used to quantify the toxic effects of a chemical on human health. They are the chemical's cancer slope factor and the chemical's reference dose. Slope factors estimate excess lifetime cancer risks associated with exposure to potential carcinogens and are multiplied by the estimated intake of a potential carcinogen to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from each slope factor. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Slope factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied. Reference doses (RfDs) indicate the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs are estimates of lifetime daily human exposure levels that include sensitive populations. Estimated intakes of contaminants from groundwater were compared with the RfD. As was the case with slope factors, RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied. These factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic health effects to occur.

With respect to the Contaminants of Concern, a table of the carcinogenicity classification is provided below:

Compound	Carcinogenicity Classification
Methylene Chloride	B2
1,1-Dichloroethene	C
1,1-Dichloroethane	C
cis-1,2-Dichloroethene	D
trans-1,2-Dichloroethene	(no data)
Chloroform	B2
1,2-Dichloroethane	B2
1,1,1-Trichloroethane	D
Trichloroethene	C-B2
Tetrachloroethene	C-B2

USEPA separates chemicals into five distinct categories ranging from Group A (known human carcinogens) to Group E (noncarcinogens). Group B1 indicates limited human data is available to characterize a specific compound as a probable carcinogen, while B2 indicates sufficient evidence of carcinogenicity in animals but with little or no evidence in humans. Group C indicates a possible human carcinogen and Group D notes that a chemical is "not classifiable as to human carcinogenicity". The health effects of these chemicals

of concern are noted in Table 6-4 of the RI report. The compounds methylene chloride, trans-1,2-Dichloroethene, chloroform and 1,2-dichloroethene were not detected above required laboratory detection limits.

No residential wells that were sampled had total carcinogenic risks exceeding 1×10^{-4} , which is the upper limit identified in the NCP. Four wells had total carcinogenic risks in the 1×10^{-5} range and nine homes has carcinogenic risks in the range of 1×10^{-6} . All other wells had total carcinogenic risks below 1×10^{-6} . The primary contaminant contributing to total carcinogenic risks was 1,1-dichloroethene with ingestion being the dominant exposure pathway contributing to risks. Hazard indices for sampled wells were all below 1, indicating that the increased risk from exposure to noncarcinogenic contaminants is minimal. At one location, the Safe Drinking Water Act Maximum Contaminant Level (MCL) for TCE was exceeded. Table 6-19 and Table 6-20 of the RI report note total cancer risks and hazard indices for each household.

Uncertainties inherent in the risk assessment process cannot be fully eliminated. The assumptions that have been made tend to be conservative, resulting in what may be an over-estimation of the actual risk from groundwater at the site. Types of uncertainty include scenario uncertainty (information used to define site-specific exposures and doses), parameter uncertainty (assumptions/parameters used in concentration, dose and risk calculations) and model uncertainty (future exposure estimates based on scientific projections). Parameter uncertainty appears to have had the greatest impact in this risk assessment because of a rather incomplete data set (23 residential wells sampled out of an estimated 600) and the lack of slope factors for site-related contaminants that have not been adequately assessed.

Investigations performed to date do not indicate that site-related groundwater contaminants are adversely impacting the environment. Although an ecological assessment relative solely to groundwater impacts has not been performed at this site, the most probable location of environmental exposure would be the Rock River. Current site data indicates that the site plume has not reached the river. Groundwater modeling estimations discussed later in this text note that the plume may have a minimal impact on the river. Endangered species or habitats of endangered species affected by site-related groundwater contaminants have not been identified in the RI.

The human health risk assessment for this site was prepared in accordance with all USEPA risk assessment guidance documents including the Risk Assessment Guidance for Superfund (December 1989).

VII. Description of Alternatives

Five response action alternatives were considered in the FS to address groundwater contamination at the Southeast Rockford Site. All remedies assume further source control and the continued operation of the GAC unit at UW35. They include the following:

- Alternative 1: No Action
- Alternative 2a: Use Restrictions
- Alternative 2b: Limited Action
- Alternative 3a: Groundwater Extraction and Air Stripping with Offsite Disposal
- Alternative 3b: Groundwater Extraction and Air Stripping with Onsite Discharge

Alternative 1 - No Action

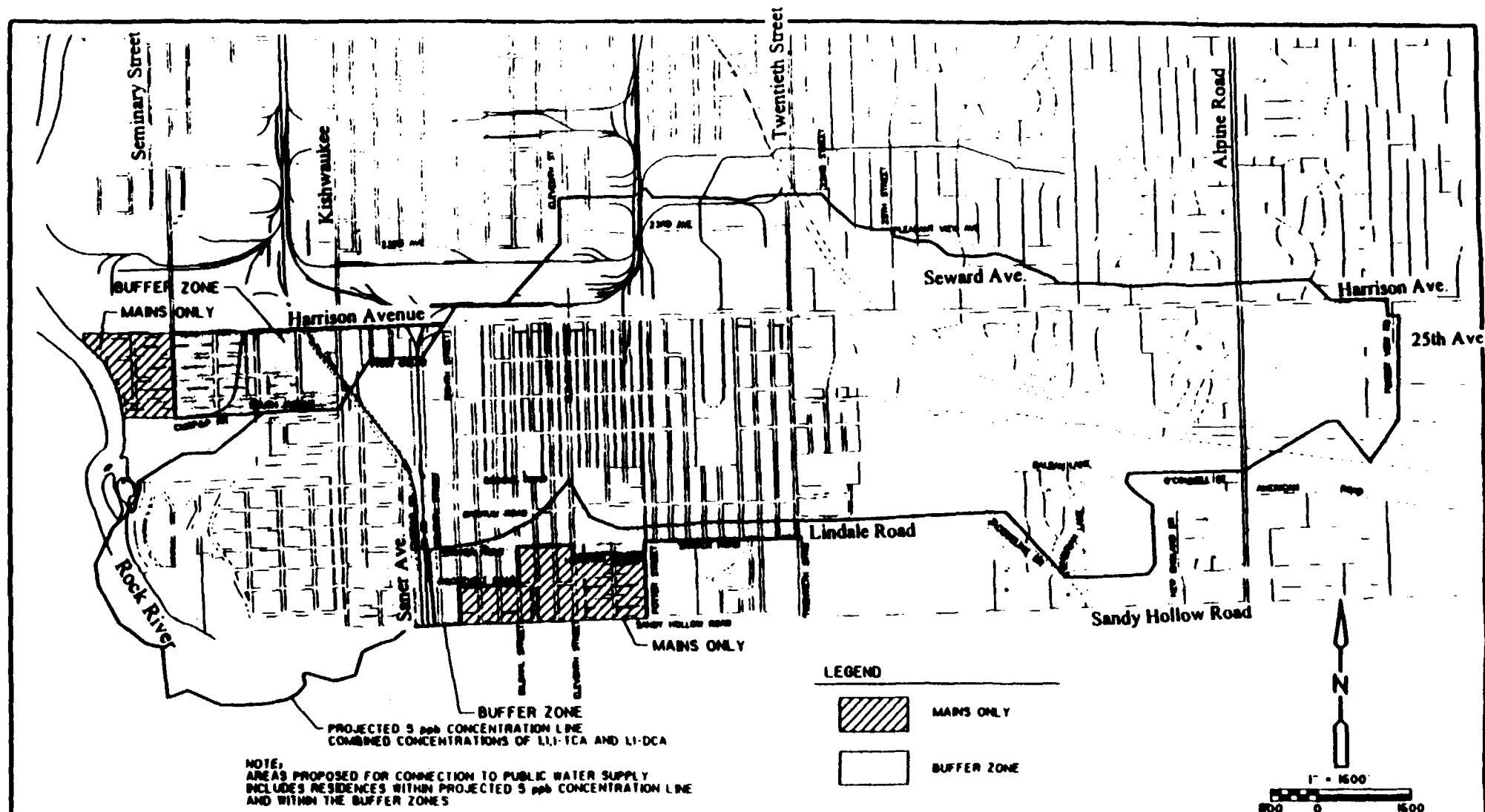
The "No Action" alternative is used to establish a baseline for comparison with other alternatives. This alternative's inclusion in the analysis of remedial alternatives is mandated by CERCLA. No response measures would be implemented in this alternative, however pursuant to CERCLA Section 121(c) (e.g. source materials being left in place) groundwater monitoring will be necessary and as such, was included as a component of this alternative. Under this alternative, groundwater will be monitored at selected existing and new monitoring wells on a quarterly basis for the next 205 years. Groundwater modeling has shown that contaminant levels for TCA in the plume will remain at levels above its MCL of 200ppb for 205 years assuming that source areas will undergo remediation. Other groups of compounds such as the dichloroethenes and vinyl chloride may necessitate a further time extension for monitoring if the concentrations of them in groundwater are expected to degrade at levels below their respective MCLs.

Cost estimates have included the installation and sampling of four pairs of new groundwater monitoring wells and one additional well upgradient of a large area of existing residential wells. 35 existing monitoring wells would be monitored on a quarterly basis for 205 years. The overall costs of Alternative 1 (No Action) are noted below:

CAPITAL CONSTRUCTION COST	\$34,000
ANNUAL O&M COST	\$55,000
PRESENT WORTH COST (at 5% for 205 years)	\$1,124,000

Alternative 2a - Use Restrictions

This alternative includes controls to restrict public usage of (and therefor exposure) to site-related contaminated groundwater in conjunction with the quarterly monitoring components of Alternative 1. Usage of groundwater will be restricted within the modeled 70 year TCA/DCA contaminant plume plus a "buffer zone" by providing all households and businesses with potable use wells an opportunity to hook up to city water (see map on page 17). Because of their



State Route 20 runs E-W just to the south of the site.

USE RESTRICTIONS

prevalence in groundwater at the site, TCA and DCA were modeled to simulate a lifetime exposure. Other less common (and more toxic) groundwater compounds, while not having been modeled in the RI, are expected to exist within this 70 year TCA/DCA plume and buffer zone. The use of these contaminants in groundwater modeling will result in a conservative determination as to the number of hookups that would be offered in this remedy.

As long-term monitoring of the plume may indicate that additional wells could become contaminated by site-related compounds at levels possibly causing adverse health effects, additional homes and businesses may receive hookups at a later date. Water main extensions on streets where private wells are present in areas adjacent to the site were included in this remedy because of the potential for future hookups. The basis for future hookups will be either MCLs, or a periodic evaluation of the groundwater modeling program that determined the area of initial hookups in this remedy, whichever is more protective of human health.

Further remediation at the identified source areas and the continued use of the GAC unit installed at the municipal well identified in operable unit 1 were included in this alternative but no costs were provided because additional work is needed at the source areas to quantify contamination and select appropriate treatment technologies. All homes and businesses receiving hookups set forth by this remedy will be compelled to abandon their potable use wells in accordance with State laws. Water quality for those receiving hookups would be guaranteed by the City of Rockford's extensive monitoring program.

The primary goal of this alternative is the protection of human health. The aquifer will not be actively restored to drinking water quality, but passive restoration is expected to occur over an extended period of time. As such, the principal component of treatment in this remedy will be natural attenuation. Groundwater modeling performed in the RI shows that over time, site-related compounds will degrade in groundwater assuming that the continued contribution of these compounds from identified source areas is eliminated. With future source area remediation being a component of the selected remedy, at least 211 billion gallons of groundwater would undergo treatment by natural attenuation. Because restoration of the aquifer is expected to be a long-term action in this remedy, only a small incremental reduction of site-related groundwater contaminants is expected on an annual basis.

Since the sand/gravel and bedrock aquifers are used for potable purposes, groundwater at the site is in the "Class I" category under State law. Complete aquifer restoration is a remedial action objective in this remedy and restoration of site-related groundwater contaminants to MCLs and State groundwater quality standards will be sought through natural attenuation in this remedy and by more active means in the upcoming source control remedy (operable unit 3).

This remedy will rapidly eliminate current and potential human health risks to site-related contaminants for homes and businesses that accept hookups provided by this remedy. Although acceptance of a hookup is not guaranteed, a rigorous education effort will be implemented to convince individuals of the protectiveness of this remedy. Education efforts have been largely successful in the past where hookups to city water were a main component of past remedies (operable unit 1) at this site. Institutional controls that can be implemented to further compel those refusing hookups will include a formal notification from the Winnebago County Health Department (WCHD) that the particular property has a contaminated well from site-related compounds. All property transactions in Winnebago county require well inspections and in the event of a contractual property transaction, this notification would be provided to both the owner of property with the contaminated well as well as the potential buyer. A list of those refusing hookups after the remedy has been fully implemented will be submitted to the WCHD.

Given that source controls will be taken at a later date, actions implemented in this remedy will assure that the groundwater quality standards set forth in 35 IAC 620 are met. The monitoring program will be consistent with 35 IAC 620.505 and 35 IAC 620.510.

In addition, a Groundwater Management Zone (GMZ) as defined in 35 IAC 620.250 will be defined at each identified source area upon completion of the source control remedy. At the edge of each GMZ, a point of compliance for groundwater contaminant levels will be established. A remedial alternative to reasonably address groundwater contamination at that point will be defined in the upcoming source control remedy.

This remedy complies with the Safe Drinking Water Act. Modeling estimations have noted that the time at which this remedy will be compliant with this law will exceed 205 years.

Cost estimations for this remedy include all aspects of the monitoring components of Alternative 1, 21,000 feet of 8" water main, and 400 city water service connections. The overall costs of Alternative 2a (Use Restrictions) is noted below:

CAPITAL CONSTRUCTION COST	\$2,016,000
ANNUAL O&M COST	\$65,000
PRESENT WORTH COST (at 5% for 205 years)	\$3,314,000

Alternative 2b - Limited Action

The "Limited Action" alternative entails all of the elements of Alternative 2a mentioned above, plus a provision to perform active groundwater extraction and treatment on a portion of the site plume. Under this alternative, contaminated groundwater from identified source areas primarily responsible for contaminants in residential wells abandoned in previous actions (see Section II of this document) would be remediated.

LIMITED GROUNDWATER EXTRACTION/TREATMENT

A nest of four groundwater extraction wells would be located along Seventeenth Street between Harrison Avenue and Reed Avenue (see map on page 20). Each well rated at 250gpm (1,000gpm total) would be completed in the sand/gravel and bedrock aquifers in 400 foot spacings at depths ranging from 154 feet to 185 feet below ground surface. Assuming source control, pumping would continue for a period of 125 years at which time the MCL for TCA would be achieved (a similar conclusion about extended treatment times for compounds other than TCA/DCA drawn about monitoring can made here also). The technology selected for treatment of the groundwater was air stripping. Off-gas treatment was not determined to be necessary in the air stripping process and treated effluent meeting State water quality standards would be discharged into a nearby storm sewer.

In addition to the protectiveness of human health inherited from Alternative 2a, the main objective of this remedy is to achieve aquifer restoration in a shorter period of time. Principal components of treatment in this remedy include natural attenuation and active remediation of groundwater. Based on future source area remediation in this remedy, the volume of contaminated groundwater to be actively treated would exceed 66 billion gallons. The remainder of groundwater would be treated by natural attenuation. Reduction rates of site-related groundwater contaminants are somewhat higher than in Alternative 2 because active groundwater treatment is being sought in this remedy. These rates are still expected to be low because only a portion of the plume is being treated. Since complete aquifer restoration is a remedial action objective in this remedy, restoration of site-related contaminants to MCLs will be sought through natural attenuation and active means as well as by additional active means in the upcoming source control remedy of operable unit 3.

Institutional controls relative to residential hookups (mentioned in Alternative 2a) would be applicable in this remedy also.

Assuming source controls will be taken at a later date, actions implemented in this remedy will assure that groundwater quality standards set forth in 35 IAC 620 are met. The monitoring program will be consistent with 35 IAC 620.505 and 35 IAC 620.510. GMZs as defined in 35 IAC 620 will be defined at each identified source area upon completion of the source control remedy. A treatment technology to reasonably address groundwater contamination at a point of compliance defined at the edge of the GMZ will be established in the upcoming source control remedy.

The remedy complies with the Safe Drinking Water Act. Modeling estimations have noted that the time at which this remedy will be in compliance with this law will exceed 125 years.

Wastewater discharges from the air stripping process would be subject to the National Pollutant Discharge Elimination System (NPDES) of 40 CFR Part 122, which in Illinois is implemented pursuant to 35 IAC 309. Treated effluent from the four extraction wells would be subject to the water quality standards of 35 IAC 302 and 35 IAC 304. The treatment works process would be operated

under the supervision of a certified operator pursuant to 35 IAC 312 and the air stripper process would be subject to 40 CFR Part 264, Part AA under the authority of the Resource Conservation and Recovery Act (RCRA), which limits organic emissions. Residues from the treatment processes would be tested to determine if they are RCRA hazardous pursuant to 40 CFR Part 261 in order to determine proper disposal methods. Treatment process residuals outlined in this remedy are not expected to be generated.

Cost estimations for this remedy include all aspects of the components outlined in Alternative 2a (Use Restrictions) plus costs associated with the construction of four groundwater extraction wells, an equalization basin and an air stripper treatment process. The overall cost of Alternative 2b (Limited Action) is noted below:

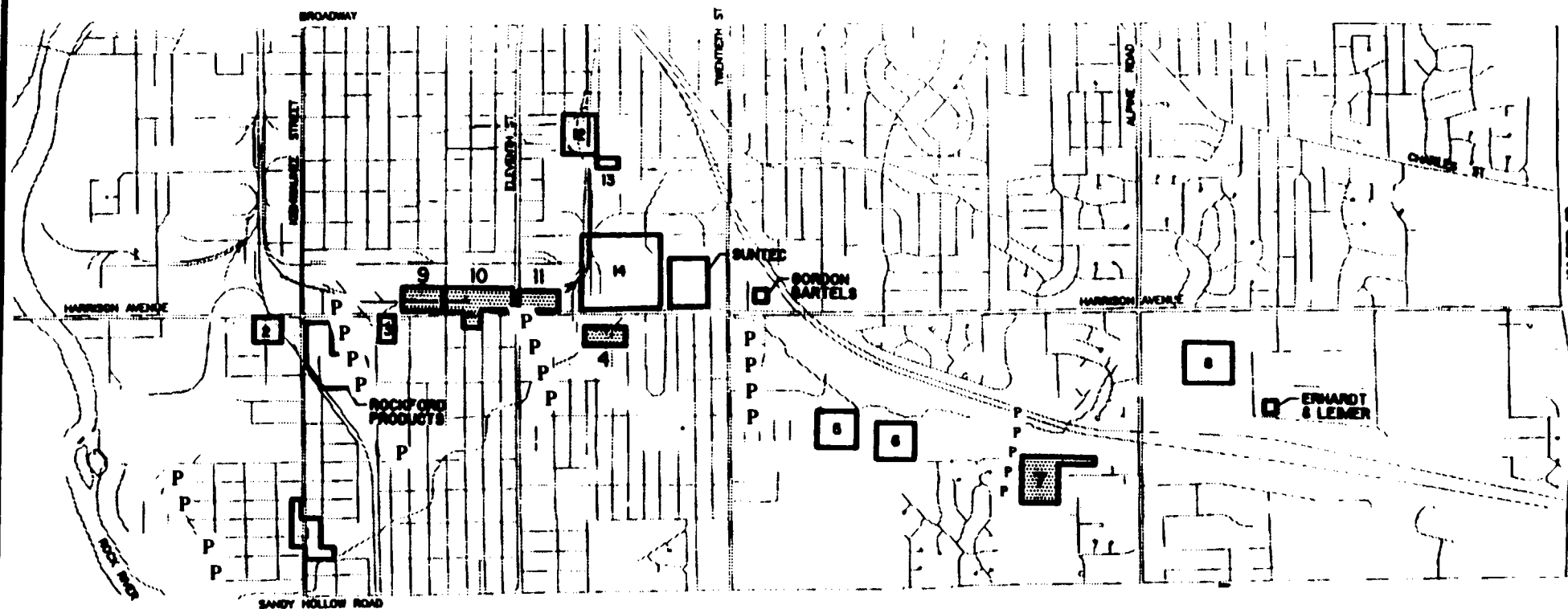
CAPITAL CONSTRUCTION COST	\$3,002,000
ANNUAL O&M COST	\$351,000
PRESENT WORTH COST (at 5% for 125 years)	\$10,021,000

Alternative 3b - Groundwater Extraction and Air Stripping with Offsite Disposal

Under this remedy, all of the elements of Alternative 2a would apply. Full-scale groundwater extraction and treatment in the aquifer would be sought in this remedy to achieve State water quality standards and the standards of the Safe Drinking Water Act in the shortest period of time. This remedy seeks to aggressively remediate site-related groundwater contaminants while assuming that source controls are to be implemented at a later date.

Twenty-two groundwater extraction wells will be installed in five separate nests throughout the site as part of Alternative 3a (see map on page 23). To achieve treatment of groundwater to State and Federal drinking water standards, these wells would intercept an estimated 211 billion gallons of contaminated groundwater at the combined rate of 5,347gpm for approximately 75 years when the MCL for TCA is reached (see assumptions of Alternative 2a regarding extended treatment times for compounds other than TCA and DCA). Off-gas treatment (carbon treatment) of organic emissions from air stripping operations at two extraction wells located at Harrison Avenue and Kinsey Street would be necessary because of locally high concentrations of Area 11-related contaminants in the plume.

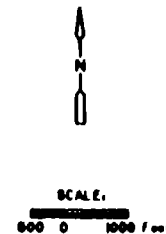
Two well nests located east of Twentieth Street would be completed in the sand/gravel and bedrock aquifers at depths ranging from 179 feet to 204 feet below ground surface. Pumping rates for the nest of five wells near Area 7 and the four wells just east of Twentieth Street would be 70gpm and 250gpm, respectively. The other three well nests would be completed in the sand/gravel aquifer at depths ranging from 90 to 133 feet below ground surface. Pumping rates for the four extraction wells located just west of Eleventh Street would be 250gpm, while the two well nests (nine wells total) closest to the Rock River would be rated at 333gpm.



LEGEND:

POTENTIAL SOURCE INVESTIGATION AREA

P Pumping Well



FULL-SCALE GROUNDWATER EXTRACTION/TREATMENT

In addition to the protectiveness of human health elements from Alternative 2a, the main objective of this remedy is to achieve aquifer restoration in the shortest period of time. Principal treatment components of this remedy include natural attenuation and active remediation of groundwater. Based on future source area remediation, the estimated volume of contaminated groundwater to be treated will exceed 211 billion gallons. Reduction rates of site-related groundwater contaminants are the highest in all remedies that were evaluated.

Since complete aquifer restoration is a remedial action objective in this remedy, restoration of site-related contaminants to MCLs will be sought through natural attenuation and active means as well as by additional active means in the upcoming source control remedy of operable unit 3. Institutional controls relative to residential hookups (mentioned in Alternative 2a) would be applicable in this remedy also.

Assuming source controls will be taken at a later date, actions implemented in this remedy will assure that groundwater quality standards set forth in 35 IAC 620 are met. The groundwater monitoring program will be consistent with 35 IAC 620.505 and 35 IAC 620.510. GMZs as defined in 35 IAC 620 will be identified at each identified source area upon completion of the source control remedy. A treatment technology to reasonably address groundwater contamination at a point of compliance defined at the edge of the GMZ will be established in the upcoming source control remedy.

This remedy complies with the Safe Drinking Water Act. Modeling estimations have noted that the time at which this remedy will be in compliance with this law will exceed 75 years.

Wastewater discharges from the air stripping processes would be subject to the NPDES program of 40 CFR Part 122, which in Illinois is implemented pursuant to 35 IAC 309. Treated effluent from the twenty-two extraction wells would be subject to the water quality standards of 35 IAC 302 and 35 IAC 304. The treatment works process would be operated under the supervision of a certified operator pursuant to 35 IAC 312 and the air stripper process would be subject to 40 CFR Part 264, Part AA under RCRA. As spent carbon from the off-gas treatment subprocess at two extraction wells would be shipped off-site for regeneration, this material will be manifested and transported to an approved regeneration facility pursuant to RCRA requirements. Residuals excluding spent carbon would be tested to determine if they are RCRA hazardous pursuant to 40 CFR Part 261 in order to determine proper disposal methods. Residuals excluding spent carbon are not expected to be generated in this remedy.

Cost estimations for this remedy include all aspects of the components outlined in Alternative 2a (Use Restrictions) plus extra costs associated with the construction of twenty-two groundwater extraction wells, six equalization basins, six air stripping units, and one GAC off-gas treatment unit. The overall costs of Alternative 3a are noted on the following page:

CAPITAL CONSTRUCTION COST	\$8,276,000
ANNUAL O&M COST	\$2,174,000
PRESENT WORTH COST (at 5% for 75 years)	\$50,723,000

Alternative 3b - Groundwater Extraction and Air Stripping with Onsite Discharge

This alternative is identical to Alternative 3a, with the exception that treated effluent (which would meet standards set forth in the Safe Drinking Water Act) would be distributed to the city's municipal water supply system and sold for potable reuse.

In addition to the components of Alternative 3a, this alternative would entail the construction of a distribution system to deliver potable water from treatment units at each of the five extraction well nests to the city's water supply system. This distribution system would include all necessary piping and six 150psi booster pumps to deliver treated groundwater to the nearest municipal water main capable of handling the average design flow of effluent from each treatment system.

Cost estimations for this remedy include the well construction and treatment components of Alternative 3a plus all elements of the distribution system mentioned above. Since treated groundwater meeting Federal drinking water standards will be sold to the city, a significant offset in treatment costs was assumed. For costing purposes, it was assumed that treated groundwater sold to the city would generate \$0.50 of revenue per 1000 gallons treated over the life of the 75 year pumping effort. The overall cost of Alternative 3b (Groundwater Extraction and Air Stripping with onsite discharge) is noted below:

CAPITAL CONSTRUCTION COST	\$14,314,000
ANNUAL O&M COST	\$310,000
PRESENT WORTH COST (at 5% for 75 years)	\$20,362,000

VIII. Summary of the Comparative Analysis of Alternatives

The Superfund program requires evaluation of alternatives based on nine criteria by which technical, economic and practical factors associated with each response action alternative must be judged. The nine criteria are categorized into three groups: threshold criteria, primary balancing criteria and modifying criteria. The nine evaluation criteria are summarized as follows:

Threshold Criteria - These must be satisfied in order for an alternative to be eligible for a final remedy selection.

1. Overall Protection of Human Health and the Environment - This criteria addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment or engineering/institutional controls.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) - This criteria addresses whether a remedy will meet all of the ARARs of other Federal and State environmental laws and/or justifies a waiver.

Primary Balancing Criteria - These criteria are used to weigh major tradeoffs among evaluated alternatives. They include:

3. Long-Term Effectiveness and Permanence - A criteria concerned with the residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, after cleanup goals have been met.

4. Reduction of Toxicity, Mobility or Volume through Treatment - The anticipated performance of the treatment technologies a remedy may employ.

5. Short-Term Effectiveness - Addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. Implementability - The technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular remedy.

7. Cost - Includes estimated capital and operation and maintenance costs also expressed as net present worth costs.

Modifying Criteria - These criteria are usually taken into account after public comment is received on the FS report and the Proposed Plan. They include the following:

8. State/Support Agency Acceptance - Reflects aspects of the preferred alternative and other alternatives that the support agency favors or objects to, and any specific comments regarding State ARARs or the proposed use of waivers.

9. Community Acceptance - Summarizes the public's general response to the alternatives described in the Proposed Plan and in the FS report based on public comments received. Evaluations under this criteria will not be completed until after the public comment period has ended.

An assessment of the relative performance of all five alternatives by highlighting the key differences among the alternatives in relation to the nine evaluation criteria is presented below:

Overall Protection of Human Health and the Environment

Alternatives 2a, 2b, 3a and 3b all provide protection of human health by virtually eliminating current and future exposures to

site-related contaminants in groundwater at levels above MCLs. This was accomplished by offering municipal water service connections to all individuals with potable use wells having exceedances of MCLs in the current plume as well as those wells inside a 70 year modeled plume and buffer zone. This modeling was performed to assess future exposures to site-related groundwater contaminants. Alternative 1 provides no protection of human health.

Alternatives 2a, 2b, 3a and 3b all provide adequate protection of the environment through varying degrees of natural attenuation and active treatment/future containment. Groundwater modeling has shown that the contaminant plume will not have an appreciable effect on the Rock River whether or not active groundwater extraction and treatment measures are implemented as long as future source control measures are part of any remedial alternative.

Compliance with Applicable or Relevant and Appropriate Requirements

All of the evaluated alternatives, with the exception of Alternative 1, would comply with chemical-specific, action-specific and location-specific ARARs provided that future source area remediation is undertaken and that aquifer restoration is a remedial action objective. These two assumptions were made for Alternatives 2a, 2b, 3a and 3b. ARARs would be attained on the shortest timeframe (75 years) for Alternatives 3a and 3b. ARARs would be attained in 125 years for Alternative 2b, while 205 years would be required for Alternative 2a to meet ARARs.

Long-Term Effectiveness and Permanence

Alternatives 2a, 2b, 3a and 3b will eliminate the residual risk associated with contaminated groundwater if identified private well owners accept hookups as noted in the four above-mentioned remedies. The city has an extensive monitoring program designed to control water quality in their distribution system, which will replace current and future-contaminated residential and commercial wells as a source of potable water. Alternative 1 does not provide any measure of long-term effectiveness or permanence.

Reduction of Mobility, Toxicity, or Volume through Treatment

Alternatives 3a and 3b offer the greatest reduction of mobility, toxicity and volume of groundwater contaminants through treatment. Similar results are expected with Alternative 2b, but to a lesser degree for reductions in mobility and volume. When implemented, the source control components of Alternatives 2a, 2b, 3a and 3b will generally have a greater impact on reduction of mobility, toxicity and volume of groundwater contaminants through treatment. Alternative 1 offers no reduction in mobility, toxicity or volume of groundwater contaminants through treatment.

Short-Term Effectiveness

Implementation of any alternative involves a small measure of human risk. Alternative 1 offers only a minimal amount of risk (e.g. exposures to groundwater contaminants or construction hazards as part of drilling activities of new monitoring wells). Alternative 2a offers a slightly higher risk (e.g. construction activities associated with watermain extensions and service connections). Alternative 2b has a somewhat higher short-term risk (e.g. additional construction activities associated with the installation of extraction wells and treatment units). Alternatives 3a and 3b possess the highest short-term risks (e.g. construction activities of more extraction wells and treatment units). Short-term environmental risks exist, such as an inadvertent creation of a conduit for downward flow of contaminants associated with drilling activities in all of the evaluated alternatives. On the whole, the probability of this occurring is minimal.

Alternative 1 can be implemented most readily (six months), followed by Alternatives 2a and 2b (18 months). Alternative 3a would take about two years to implement, while Alternative 3b would take about 2.5 years.

Implementability

Materials, labor and equipment needed to implement all of the alternatives are readily available and construction/installation techniques are fairly routine. Alternative 1 possesses the highest degree of implementability followed by Alternatives 2a, 2b and 3a. Alternative 3b would be the most difficult to implement based on additional water main constructions for water distribution from six treatment units and the modifications that would be necessary in the city's water distribution network to accept this water.

Cost

Present net worth costs for the evaluated alternatives range from \$1,124,000 in Alternative 1 to \$50,723,000 in Alternative 3a. A rather complex network of extraction wells and an exceedingly high volume of contaminated groundwater treated over an extended period of time are responsible for the higher costs of Alternative 3a.

State/Support Agency Acceptance

USEPA Region V, as designated support agency for this site, concurs with the Illinois Environmental Protection Agency's recommendation of Alternative 2a (Use Restrictions) as the selected remedy for the Southeast Rockford Groundwater Contamination Site.

Community Acceptance

The public has been given the opportunity to review and comment on the FS report and Proposed Plan within a thirty day public comment period. Two public meetings and two formal public hearings were held for the general public to ask questions and provide comments that relate to all of the evaluated alternatives. Community acceptance of the preferred remedy has been generally favorable. All comments, written and oral, compiled during the comment period for the FS and Proposed Plan as well as responses to these comments are noted in the Responsiveness Summary (see Attachment A).

IX. The Selected Remedy

Based on the consideration of the requirements of CERCLA, the detailed analysis of alternatives and public comments, both IEPA and USEPA Region V have determined that Alternative 2a is the most appropriate groundwater response remedy for the Southeast Rockford Groundwater Contamination Site. This alternative essentially restricts the usage of groundwater as a potable water source at the site. In addition, with source controls being a component of Alternative 2a, this remedy will offer a combination of natural attenuation and probable containment as a remedy to site-related contaminated groundwater in the sand/gravel and bedrock aquifers.

A summary of the major components of the selected remedy is shown below. In-depth discussions of these components were presented in Section VII (pages 16 through 19) of this document.

- Groundwater Monitoring for 205 years
- Water Main Installations
- Service Connections for Selected Private Potable-Use Wells
- Future Service Connections for Remaining Potable-Use Wells
- Continued Operation of GAC Unit at Municipal Well UW-35
- Future Source Control Measures at Four Identified Source Areas of Groundwater Contamination
- Institutional Controls

Given that future source controls are assumed in this remedy, the actual degree to which groundwater is remediated under this remedy is dependant on the extent to which the four identified source areas are remediated. These further actions are necessary to assure that the selected remedy meets the two threshold criteria of remedy selection. Aquifer restoration will take place over an extended period of time under this remedy.

IEPA's basis for remediation goals are ARARs that include the Safe Drinking Water Act, and the Illinois Groundwater Protection Act. Corresponding risks associated with hypothetical exposures to a mixture of detected groundwater contaminants at ARAR concentrations (or risk-based concentrations in the absence of an ARAR concentration) were calculated. Total cancer risks at (1.3×10^{-4}) only slightly exceeded USEPA's acceptable risk range of 1×10^{-6} to

1×10^{-4} . Although this finding indicated a minimal residual risk outside of the acceptable risk range, USEPA guidance states that compliance with chemical-specific ARARs is generally considered protective. A similar calculation was likewise performed to compare hypothetical noncarcinogenic risks to ARAR concentrations. A calculated hazard index of 1.8 was only slightly over the hazard index cutoff of 1, thereby indicating a slight residual risk. Because both of these calculations indicated residual risks present, alternative cleanup levels were developed for this remedy. These alternative cleanup levels are presented in Appendix A.

Capital cost assumptions for Alternative 2a are presented below:

Component	Quantity	Unit Cost	Total Direct Capital Cost
1. Monitoring Well Installations	9	\$2,778	\$25,000
2. Water Main Installations	21,000'	\$50/LF	\$1,058,000
3. City Water Service Connections	400	\$1,000	\$400,000
4. Future Service Connections	0	0	0
5. Operation of GAC Unit at Municipal Well UW-35	0	0	0
6. Source Control Measures (Operable Unit 3)	0	0	0
7. Institutional Controls	0	0	0
Total Direct Capital Costs			\$1,483,000
Engineering/Design Costs @15%			\$222,000
Contingencies @15%			\$222,000
Other Indirect Costs (Legal Fees and Regulatory License Costs)			\$89,000
Total Indirect Capital Cost			\$533,000
<u>TOTAL CAPITAL COST:</u>			<u>\$2,016,000</u>

The annual operation and maintenance (O&M) costs for Alternative 2a are presented below:

Component	Unit Cost	Total Direct Annual O&M Costs	Present Worth O&M Annual Costs
1. Groundwater Monitoring at 35 wells	\$300	\$42,000	\$840,000
2. Water Mains O&M		0	0
3. City Water Service Connections		0	0
4. Future Service Connections		0	0
5. Operation of GAC Unit at Municipal Well UW-35		0	0
6. Source Control Measures (Operable Unit 3)		0	0
7. Institutional Controls		\$8,400	\$168,000
		Total Direct Annual/Periodic Present Net Worth O&M Costs	\$1,038,000
Administrative, Insurance, Tax and License Costs @10% of Direct Annual O&M Costs			
		\$5,200	\$52,000
Maintenance Reserve and Contingency Costs @15% of Direct Annual O&M Costs			
		\$7,800	\$156,000
		Total Indirect Annual/Periodic Present Net Worth O&M Costs	\$260,000
		<u>TOTAL ANNUAL/PERIODIC PRESENT NET WORTH COSTS</u>	<u>\$1,298,000</u>

Total costs for Alternative 2a are defined as the total of the capital costs plus annual/periodic present net worth costs.

TOTAL CAPITAL COSTS	\$2,016,000
TOTAL ANNUAL/PERIODIC PRESENT NET WORTH COSTS	\$1,298,000
<u>TOTAL PRESENT WORTH COSTS FOR ALTERNATIVE 2a</u>	<u>\$3,314,000</u>

The selected remedy for this site is the same preferred alternative presented in the Proposed Plan developed and issued by the IEPA. Details regarding components of this remedy may be altered as a result of the remedial design and actual number of water service hookups that will be performed. Under a fund-lead pretext, the IEPA will continue to provide direct oversight of design, construction and long-term remedial action aspects as sought by this selected remedy.

X. Statutory Determinations

The selected remedy satisfies the requirements of Section 121 of CERCLA, which are to protect human health and the environment; comply with ARARs; be cost effective; utilize permanent solutions and alternate treatment technologies to the maximum extent practicable; and satisfy the preference for treatment as a principle element of the remedy.

Protection of Human Health and the Environment

Implementation of the selected remedy will reduce and control potential risk to human health from exposure to site-related groundwater contaminants both now and in one lifetime by providing individuals with potable-use wells with a safe and reliable alternative source of drinking water. The remedy will reduce risk to within the acceptable range of 1×10^{-4} to 1×10^{-6} excess cancer risk and hazard indices for noncarcinogens will be less than one. To the extent that groundwater monitoring indicates future unacceptable risks associated with exposure to groundwater contaminants, additional hookups to city water will be provided under this remedy.

The selected remedy will reduce and control potential groundwater risks to the environment through future source control components of this remedy. Groundwater modeling as performed in the RI indicates that the environment (e.g. the Rock River) will not be impacted significantly if source controls are implemented at each of the identified source areas. Source area controls will be implemented at Area 4, Area 7, Area 9/10 and Area 11 as part of operable unit 3.

No unacceptable short-term risk or cross-media impacts will be caused by implementation of the selected remedy.

Compliance with ARARs

With respect to hazardous substances, pollutants, or contaminants that will remain on site, Section 121 (2)(A) of CERCLA requires that the selected remedial action be compliant with all applicable or relevant and appropriate requirements or a waiver must be justified. The selected remedy will comply with Federal ARARs or State ARARs (where State ARARs are determined to be more

stringent). ARAR waivers required at this time have not been identified. "To Be Considered" (TBC) criteria are included in the discussion of ARARs; however TBCs are not ARARs. They may be used to design a remedy or set up cleanup levels if no ARARs address the site or if existing ARARs do not ensure protectiveness. TBCs may include advisories or guidances, for example.

A listing and brief discussion of the three major groups of ARARs that will be attained by the selected remedy is provided here.

Chemical-Specific APARs: Chemical-specific ARARs regulate the release of specific substances to the environment that have certain chemical and toxicological characteristics.

- Safe Drinking Water Act (SDWA) National Primary Drinking Water Standards (40 CFR Part 141), MCLs are applicable and proposed MCLs are to be considered.
- Safe Drinking Water Act (SDWA) National Primary Drinking Water Standards (40 CFR Part 141) non-zero MCLGs are applicable and non-zero proposed MCLGs are to be considered.
- Illinois Groundwater Quality Standards (35 IAC 620.410) are applicable groundwater standards.

Location-Specific ARARs: Location-specific ARARs are those requirements that relate to the geographic location of the site.

- Federal Endangered Species Act of 1973, as amended. This Act requires that actions must be performed to conserve endangered or threatened species located in and around the site. Activities carried out under any action must not destroy or adversely modify the critical habitat upon which endangered species depend.

Action-Specific ARARs: Action-specific ARARs are requirements that define acceptable treatment and disposal requirements for hazardous substances. Substantive requirements of the following may be ARARs.

- Resource Conservation and Recovery Act (RCRA) at 40 CFR Part 261 is applicable for identification of hazardous wastes (e.g. spent carbon from GAC at UW-35) for identifying proper disposal of wastes and may be relevant and appropriate for sampling activities; delegated program in Illinois is implemented at 35 IAC 721.
- Resource Conservation and Recovery Act (RCRA) at 40 CFR Part 262 is applicable for generators of hazardous waste (if procedures outlined in 40 CFR Part 261 characterize spent carbon noted above as a hazardous waste) if such materials are disposed of offsite; delegated program in Illinois is implemented at 35 IAC 722.

- Resource Conservation and Recovery Act (RCRA) at 40 CFR Part 263 is applicable for transporters of hazardous wastes (e.g. if procedures noted in 40 CFR Part 261 characterize spent carbon as a hazardous waste; the delegated program in Illinois is implemented at 35 IAC 723.
- Resource Conservation and Recovery Act (RCRA) at 40 CFR Part 264 is applicable for groundwater monitoring and storage or treatment of hazardous wastes (e.g. spent carbon) if generated; delegated program in Illinois is implemented at 35 IAC 724, Subpart F.
- Illinois Groundwater Quality Standards at 35 IAC 620, Subpart E are applicable for the groundwater monitoring component.
- Illinois Solid Waste and Special Waste Handling Regulations at 35 IAC 808 and 35 IAC 809 are applicable for off-site special waste hauling (if spent carbon wastes are characterized as special wastes).
- Illinois Water Well Construction Code at 77 IAC 920 is applicable for the construction and abandonment of soil borings and monitoring wells.

Cost Effectiveness

IEPA and USEPA agree that the selected remedy affords overall effectiveness proportional to cost. Costs of the selected remedy were greater than the "No Action" alternative, but the No Action alternative offers no general degree of effectiveness, thereby ruling it out in a cost/effectiveness analysis. A cost versus effectiveness comparison of the selected remedy to remedies that advocated more aggressive groundwater treatment showed that the selected remedy was found to be generally as effective but implementable at one third the cost of the next costliest alternative. By comparison, costs of the selected remedy were only 7% of the most expensive alternative (Alternative 3a).

The decision to provide water mains without service connections in areas adjacent to the site was based on groundwater modeling that predicted that the plume could move into areas of potable-use wells at contaminant concentrations above health concern. While resulting in a higher initial capital cost, overall costs of constructing an entire water main system to serve this area would be significantly less than constructing one incrementally as modeling predicted slow movement of contaminants into these areas. The same criteria was employed to justify mains/hookups at homes and businesses not currently affected by groundwater contaminant levels above MCLs.

In summary, the cost comparison of passive groundwater treatment in the selected remedy versus active treatment of Alternatives 2b, 3a and 3b, determined that the added expenses of active groundwater treatment remedies to justify a shorter timeframe for ARARs to be met was unnecessary.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy meets the statutory requirement to utilize permanent solutions and treatment technologies to the maximum extent practicable in a cost-effective manner.

Of the four remedies that complied with the threshold criteria, the IEPA and USEPA have determined that the selected remedy represents the best compromise among the five balancing criteria. With the hookup provisions of Alternatives 2a, 2b, 3a and 3b, these four remedies were found to have an equally high degree of long-term effectiveness and permanence. Remedies that advocated active groundwater extraction/treatment (Alternatives 2b, 3a and 3b) provided a greater degree of contaminant mobility and volume reduction through treatment than the selected remedy. This however, was somewhat offset by the selected remedies' greater short-term effectiveness and implementability.

The cost criteria of the four remedies meeting the threshold criteria had a significant impact on the remedy selection process. Remedies that sought active groundwater treatment had only a slight advantage over the selected remedy with short-term effectiveness and implementability criteria factored in. Given that the selected remedy could be implemented at less than one-third the cost of the limited groundwater extraction/treatment remedy cost was a decisive factor in determining that Alternative 2a represented the best tradeoff among alternatives that satisfied the threshold criteria.

If reference to how community acceptance was factored in the decision making process, the responsiveness summary of the previous operable unit indicated widespread concern that not enough was being done to address residential wells that become contaminated in the future. The selected remedy included provisions to address these concerns through groundwater modeling that maximized the number of residential hookups. In addition, hookup criteria in the selected remedy was extended to businesses (e.g. restaurants) that distributed well water to clients. These concerns were noted by several Rockford businesses in the responsiveness summary of the first operable unit and were addressed in the selected remedy.

Preference for Treatment as a Principal Element

There will be some treatment of contaminated groundwater as a side benefit to GAC treatment at the municipal well, however in a general sense, the preference for active treatment of groundwater as a principal element in the selected remedy is not met by this portion of the overall site remedy. It has been noted that site-related groundwater contaminants will undergo treatment by means of natural attenuation in the selected remedy, which will be made more effective because the source areas will undergo remediation in the future. Since future source area remediation is part of the selected remedy, options to treat site-related contaminants at

their respective source areas through active means (such as source reduction) or through engineering controls (such as source containment) remain open and will be addressed more thoroughly in a subsequent Record of Decision that will address source control.

As summarized in the cost effectiveness portion of this section, IEPA and USEPA found that the additional costs of implementing active groundwater treatment methods did not justify the attainment of ARARs on a shorter timeframe (70 years rather than 205 years), when human health and the environment was adequately protected.

XI. Documentation of Significant Changes

The Proposed Plan for the Groundwater Response Action at the Southeast Rockford Groundwater Contamination Site was issued for public comment on July 14, 1995. The Proposed Plan identified Alternative 2a (Use Restrictions) as the preferred alternative. The public comment period ended on August 16, 1995. IEPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary.

**TOTAL RISKS AND HAZARD INDEX AT ALTERNATIVE CLEANUP LEVELS
SOUTHEAST ROCKFORD GROUNDWATER CONTAMINATION**

Chemical	Concentration	Total Hazard Index	Total Cancer Risk
Methylene Chloride	0.005	2.9E-03	7.9E-07
1,1-Dichloroethene	0.004	1.4E-02	6.1E-05
1,1-Dichloroethane	0.7	6.9E-01	
Cis-1,2-Dichloroethene	0.01	2.9E-02	
Trans-1,2-Dichloroethene	0.01	1.5E-02	
Chloroform	0.00015	4.4E-04	5.3E-07
1,2-Dichloroethane	0.005	1.7E-01	2.5E-05
1,1,1-Trichloroethane	0.01	2.2E-02	
Trichloroethene	0.005	1.7E-02	2.0E-06
Tetrachloroethylene	0.005	2.1E-02	5.1E-06

Modified cleanup levels in italics and bold

**TOTAL
HAZARD
INDEX**

**TOTAL
CANCER
RISK**

9.8E-01 **9.5E-05**